

T E R R A

SUMMER 1999
VOLUME 36 ■ NUMBER 4 / 5

NATURAL HISTORY MUSEUM OF
LOS ANGELES COUNTY



AERIAL DRAGONS

EVER SO CAUTIOUSLY, I SQUATTED LOWER, hoping my prey would not take flight. Water in the small channel rushed against my irrigation boots, making it difficult to remain still. Drops of sweat ran down my face. Fortunately my quarry stayed in place: I raised my camera to my eye, and as the small image wove in and out of focus, I held my breath and clicked the shutter.

The subject of the photograph was a damselfly, a resplendent male *Rhinocypha iridea* sitting on a bamboo bridge in northern Thailand. My interest in damselflies and dragonflies has taken me around the world, and on this trip I had come to study and photograph these creatures for a Finnish book on the Odonata of Thailand.

The Odonata includes a total of about 5,500 species of dragonflies and damselflies. Compared with the more than 350,000 species of beetles and 150,000 species of moths and butterflies, the order is relatively small. But what they lack in numbers, the Odonata—which are often called the birds of the insect world—make up for in beauty and size. The largest dragonfly, from tropical northern Australia, has a wingspan of 6½ inches. But the largest species of Odonata is not a dragonfly but a damselfly, from tropical America; with a wingspan that can exceed 7 inches, this impressive insect has been dubbed “the helicopter.”

The damselflies, which make up the suborder Zygoptera, have heads shaped like dumbbells and usually hold their wings over their backs when at rest; their flight is usually weak, and they often stay close to vegetation or return again and again to a particular site. In contrast, the dragonflies,



which constitute the suborder Anisoptera, have hemispherically shaped heads and generally hold their wings outspread when resting. Strong fliers that appear to be on the wing almost constantly, many dragonfly species fly great distances patrolling stream or river margins; some are extremely rapid in flight.

The comparatively large size of dragonflies and damselflies makes it easy to observe their mastery of flight—perhaps no other insects are so dependent upon their wings. They feed on flies and other insects, which they catch in midflight. And many species also mate in midair, using a system that is unique. The male must first clasp the female by the head or thorax to achieve a tandem position. He then discharges sperm from the tip of his abdomen into his penis, which is at the abdomen's base. The female, if she senses a correct fit, then works the pair into a “wheel” position by bringing the tip of her abdomen into contact with the penis.

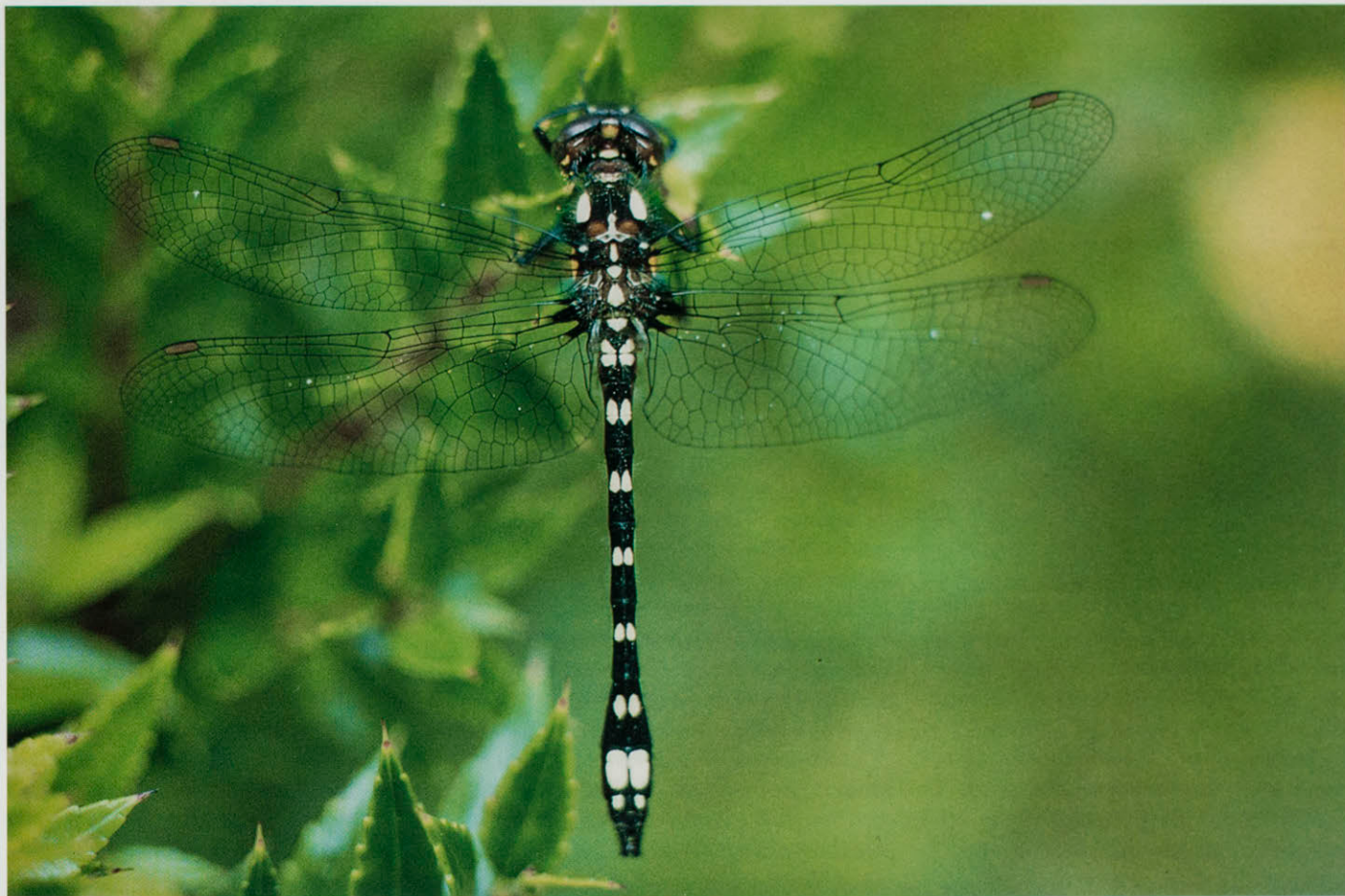
The dragonfly's penis serves two functions. Before discharging his own sperm, the male uses it to scoop out any sperm left in the female from a previous mating. It is thus in his best interest to remain with the female

until she deposits her eggs, to ensure that his own sperm are not discarded by another suitor. It is common to see an egg-laying female accompanied by a male, either hovering above or actually locked in tandem with her.

All Odonata are in one way or another aquatic: some species exist out of water but always in a moist environment. Although egg-laying in many dragonflies is simply a process of dipping the abdomen in water and dropping eggs out, all damselflies and the more primitive dragonflies have an ovipositor that they use to insert the eggs



COVER: Dragonflies, by Allan Davey, for Masterfile. When Mr. Davey, a Toronto-based artist, was asked to produce a series of images representing speed, he thought first of dragonflies because of a fascination with the contrast between their small size and their speed and agility: “For us,” he says, “it would be like flying at 500 miles per hour and turning 90 degrees in an instant.” His digital image, created around a species of *Aeshna*, was honored in *Applied Arts Magazine's* eighth annual Photography and Illustration Contest and published in the issue for July/August 1999.



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Above: A male dragonfly, *Gomphomacromia paradoxa*, from Chile. Left: A dragonfly, *Libellula croceipennis*, from Arizona.

Page 2, top: A male damselfly, *Rhinocypha iridea*, on a bamboo bridge in Thailand. Bottom, a pair of damselflies, *Telebasis salva*, mating in Arizona. The small black poppyseed-like structures hanging from the underside of the male (top) are hitchhiking phoretic mites.

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into the bark or stems of plants, often under water. Perhaps the most bizarre oviposition sites are those of the helicopter damselflies, which use their 4-inch long abdomens to reach down to the bases of epiphytic plants or into water-filled tree holes in the New World tropics. Helicopter damselfly adults thus can be found far from open water because they are able to reproduce by exploiting aquatic habitats available to few other species of Odonata.

The aquatic larvae are energetic predators with a unique morphological advantage: they have a prehensile lower lip, jointed so that it can be swiftly extended to grab almost any small animal that swims

within reach. Many nymphs live on the bottom of streams or ponds; some burrow or kick sand over themselves so that, like miniature alligators, only their protruding eyes are exposed above the substrate. The most voracious larvae are in the family Aeshnidae, which includes some of the largest and most powerful dragonflies. The elegantly streamlined nymphs in this group hunt prey that might be hidden in vegetation in slow-moving streams or ponds.

Members of the Odonata experience what is known as incomplete metamorphosis, in which the developing insect undergoes three distinct life stages as it is transformed from egg to nymph to adult. The larval stage, which may last from 30 days to 4 to 6 years, ends when the nymph crawls out of the water and molts for a final time, shifting from a purely aquatic existence to one that is primarily aerial.

Several societies of Odonata enthusiasts have sprung up in recent years, fueling a



new interest in dragonfly watching. About 435 species are known from the United States, and discoveries are still being made, with eighteen new species and subspecies described since 1980, and two or three others remaining to be formally named. Many diligent amateur workers exploring new localities have discovered other species that have remained relatively unknown since they were first recognized by science some 50 to 100 years ago. With so much remaining to be learned, the new societies and Odonata watchers are certain to increase our knowledge of the habits of these agile dragons and damsels of the air.

ROSSER GARRISON

Dr. Garrison is senior biologist and entomologist with the office of the Agricultural Commissioner and Weights and Measures for the County of Los Angeles and a Research Associate of the Natural History Museum. As entomologist for the county, he handles inquiries from the public regarding insects and identifies pests and potential pests entering the county from other states. He has written more than forty papers, including three book chapters, on the ecology, population dynamics, and systematics of dragonflies from the New World tropics.

Above, left: A newly emerged male dragonfly, *Aeshna variegata*, clings to the "skin," now discarded, that encased it as a nymph. **Right,** a male *Lathrecista asiatica asiatica* rests near a pond in Thailand. **Below,** two male damselflies, *Coelliccia loogali*, confront each other in a battle over territory in Thailand.



THE WORLD IN ME

Expressions of Urban Youth

My mask represents the Mexican culture I gained from my mom and the American culture I got from my dad and because I was born in the U.S. . . . You would use this mask when two elements or people come together because the eagle represents both the U.S. and Mexico.—Michelle Estrada, 1998

My mask is entirely circular . . . and represents the calm ocean that makes a person sigh with hope. It stands for the air that we breathe in and my love for the sea in Colombia. The sea completes us and our humanity.—Viviana Gomez, 1998

MASKS HAVE LONG BEEN AN ESSENTIAL part of ceremonial life in many regions of the world. They have been used in reenactments of myths of creation, as instruments of social order, as objects of healing, and in rituals marking

transitions in the lives of individuals. In many traditions, masks play an important role in maintaining balance between the needs of the people of a community and the integrity of the environment around them.

As a contemporary art form, masks embody moments in time for their creators, blending past experiences, current events, and dreams for the future. When the mask makers are children, the images that emerge—which transcend everyday words and thoughts—are often heartfelt and sometimes quite surprising. For a child, the act of fashioning a mask can be an introduction to the creative process engaged in by fine artists everywhere.

More than sixty masks created by students from three schools in the community of El Sereno, just northeast of downtown Los Angeles, are on exhibition at the

Natural History Museum through November 7. The masks and the accompanying notes from the artists' journals show the impact of youngsters' encounter with the artistic process and serve as a record of their increasing awareness of ecological issues and of their part in conservation of natural resources.

The works on exhibit at the museum were created as part of a unique environmental and career training program, the Natural Resources Partnership for Youth Achievement, that began in Los Angeles schools in El Sereno and is sponsored by the Natural Resources Conservation Service and the Forest Service, two branches of the U.S. Department of Agriculture. Working through the partnership, the Los Angeles Unified School District is supporting a series of programs geared to giving urban children an appreciation of natural resources

Photographs by Dick Meier

The World of Nature. Papier-mâché and clay, 12½ inches high. Edsel Paz, El Sereno Middle School, 1998.

"In Guatemala, everyone takes care of nature. . . . nature is its riches. Animals are her children. Rivers and lakes are her hair that rolls down her neck. A necklace of flowers is given to her from God, her Father; and a golden tree is her crown. The dog represents all pets, the duck is for all the birds, the elephant is for all land animals. The walrus is for all sea mammals. Turtle is for reptiles and frog for amphibians. The rose is for all the flowers, the tree is for the plants. Blue is for the water."



and an awareness of careers and opportunities for service in resource stewardship. The collaboration satisfies the district's own goals of improving science and math education for its students.

When I first started making the mask, I had to think with my hands to sculpt the clay into a shape. . . . When we started painting, the mask seemed to start living.—Susana Sanchez, 1997

TO BE MOST EFFECTIVE, lessons in ecology and environmental science must involve imagination and invention. Among a number of stimulating programs and field trips offered through the Natural Resources Partnership for Youth Achievement are the workshops in mask making, which I lead. As they design and construct their masks, the students working with me consider a number of cultures where people have lived the cycles of their lives in close connection with the natural world. The children develop links with the ideas about the environment inherent in their own cultural backgrounds, and they establish a sense of their place within the local and regional ecologies that surround their schools and homes.

The creation of a mask requires considerable intellectual effort. Students test and refine their designs and change the mask and its decoration as more information is gathered. They hone their skills of observation and identify their own problem-solving strengths. I ask them to keep journals throughout the program; their explorations

and achievements in the workshop add meaning and dimension to their environmental studies and prepare them to consider possible careers in conservation of natural resources as well as the roles they might have as citizens in protecting the environment.

The masks finally are individual bridges to what matters deeply to all of us.

JUDY LEVENTHAL

Through her company, Adventures in Creativity, artist Judy Leventhal has conducted mask-making workshops for young people in southern California schools and universities for more than 20 years. This fall she will be working with the museum's new Wells Fargo Neighborhood Learning Program, which serves local audiences during after-school hours. The students who participate in this program will be guided

through a nature collage art event to stimulate their thinking about the environment.

The Los Angeles Unified School District collaborates with the Natural Resources Partnership for Youth Achievement through the district's Los Angeles Systemic Initiative, a program aimed at improving students' education in math and science throughout their school careers. Los Angeles Systemic Initiative is sponsored in part by the National Science Foundation; through its Education Division, the Natural History Museum has provided venues and resources for the initiative.

The mask-making program is generously supported by the Kirkeby Foundation. Ms. Leventhal thanks the teachers and administrators at three El Sereno schools—Environmental Studies Magnet, Multnomah Elementary School; Math, Science and Technology Magnet and Gifted Magnet, El Sereno Middle School; and Outdoor Science Academy, Woodrow Wilson High School—for their involvement in the mask-making workshops.

Tiger Dancer. Papier-mâché and clay, 11 inches high. Antoinette Lipsun, El Sereno Middle School, 1998

"Tiger Dancer is a colorful mask representing my Filipino-Chinese culture.

"We have a festival called Chinese New Year and a Lion Dance. My mask looks like the dancer at the end of the dance.

"On the top of my mask is a cross . . . when I grow up I want to be a nurse. The yellow represents how sunny my generation is. We have to be optimistic. We have mostly two of everything. Two New Years, and two calendars. My real calendar is the Zodiac. Each year represents an animal. That is what makes my culture so exciting."



***The Gorilla in Pain.* Papier-mâché and clay, 13 inches high. Joshua Perez-Negron, Multnomah Elementary School, 1998.**

"I was happy when I finished my mask. I learned that making a mask isn't easy, and this is our second to last session.

"My figures on the crown are dancing, and my mask has pain because people are killing the gorilla. The gold on my mask represents the brief happy dancing. My mask has a banana because monkeys and gorillas like bananas."



***The Black Bear.* Papier-mâché and clay, 10 inches high. Michael Macias, Multnomah Elementary School, 1998.**

"Today I just finished my mask, and I used a lot of shapes because I wanted to be creative. . . . It was science and math mixed together because . . . I had to measure with my eyes, and it was hard to make the mouth.

"My mask is a black bear because when hunters want to kill it, it will be camouflaged. The mask has a lot of happiness and unhappiness. The mouth shows anger. The battery in my mask is about how I want to be an electrician. The face shows strength. The colors I used were white, brown, black, gray, pink—I picked those colors because they are beautiful colors."



***Buddha's Bronze Eye.* Papier-mâché and clay, 15 inches high. Bonnie Taing, El Sereno Middle School, 1998.**

"The mask shows the High God of my religion and tells about my background. I am Chinese-American, but my ancestors are from Cambodia. At one time, the Cambodian land was treasured with rich minerals. The metallic colors I chose symbolize this.

"My mask is a close image to Buddha. Buddha's bronze eye on my mask is very special and of great importance. It shows how Buddha observes the world and protects it.

"This mask makes me feel very emotional on the inside and very happy, because the mask is smiling with a pleasurable, firm look."

Visions and Sounds of Acoustic Drums. Papier-mâché and clay, 10½ inches high. Phillip Rodriguez, Woodrow Wilson High School, 1999.

"The image of my mask came to me slowly. Eventually I made drums. I love the way drums look, I love the smell of a new drum and I love to talk about drums.

"I put drum sticks on the sides of the drum that speaks. I get overjoyed when my drums are being played by me.

"While making the mask, the clay was giving a calm feeling that I enjoyed."



Onyx. Papier-mâché and clay, 8½ inches high. Aaron Chinae, Multnomah Elementary School, 1998.

"As we started mask making, the clay felt all squishy, and smashy when I pushed it. It got all over us, in our hair, in our clothes, on our faces. I learned that clay comes from the earth; we will recycle the clay.

"My mask is a cougar because that is my favorite animal. . . . My feeling in my mask is happiness and joy. The habitat is in the wild, where tigers and lions and jaguars live and the climate is hot."

IMAGING NATURE

The photographs of Joel Aaron Glassman

INSTEAD OF SIMPLY USING THE WORD “photography,” artists now speak exclusively in terms of “photo-based” art. Photography as we knew it has been eclipsed—the field has broadened unimaginably because of new technologies that have revolutionized the practice of mechanically recording images of the world in which we live. In the digital age, the “image” resides as data in cyberspace; it can be electronically cut, pasted, colored, and morphed, and the photographic print is now downloaded and output in infinite multiples of any size.

Joel Aaron Glassman is not party to any of this. Mr. Glassman has consciously chosen to revisit practices of the past, opting for more immediate hands-on technologies that bring him and us closer to his primary subject, which is nature. He works with a large format view camera and incorporates the chemical subtleties of nineteenth-century darkroom techniques to produce dramatically beautiful prints. A selection of his work is now on view in the ground floor galleries of the Natural History Museum of Los Angeles County, through September 6.

Mr. Glassman is a graduate of the High School of Art and Design in New York City and received a bachelor of fine arts degree in 1967 from the University of New Mexico. From 1970 to 1985, he lived in the San Francisco area working in video, installation, and performance art. His work from this period is archived at the Pacific Film Archives and the University Art Museum in Berkeley, Mills College in Oakland, and the Oakland Museum of California. In the late 1980s he again lived in New York City and worked as a freelance illustrator/cartoonist for the *New York Times* and other publications.

In 1986, Mr. Glassman purchased a 4-by 5-inch wooden field camera and lens and began to create a series of platinum palladium photographic prints. He has lived in Pasadena since 1990 and has continued to pursue his art as a photographer. The images included in the Natural History Museum's exhibition are indicative



of his production; most series are printed in several different sizes, and he often produces distinct editions that employ different printing processes and techniques. “I enjoy the ‘craft’ of photography,” Mr. Glassman states. “The way a picture is taken, the film is developed, and the image is printed—all contribute to the final expression of that particular image.”

Mr. Glassman's *Little Monsters*, a series

of close-up photographs of arthropods, is a body of work still in progress. Using mail-order specimens generally from foreign countries and already dead and preserved, he poses insects for the camera by spreading their wings, sometimes breaking them apart, reorienting them, and pinning them in a desired position. The exotic nature of these creatures as well as the artist's use of extreme magnification contribute to the impact of





the images. The scale of the finished images is significant: the prints are mural size, and the insects are elevated to "little monster" status. The prints are not softened through vintage processes; instead they are printed with a coarse black and white cinematic edge.

Another series, *Morning Becomes Electra*, features images of orchids. These are not the usual flower pictures; in fact, a number are difficult to recognize as plants at all. Again, the photographs are highly

manipulated by the artist and printed so beautifully that they exude a dramatic sensibility reminiscent of the work of Hollywood glamour photographers such as George Hurrell. Mr. Glassman has also used an uncommon point of view to achieve ambiguous images that are suggestive more than they are descriptive. His flowers look strange, more like space aliens, dangling worms, or wondrous pods. Like the "little monsters," the orchid pictures are close-ups

that simplify their subjects into enigmatic organic entities.

As a source of artistic inspiration, Mr. Glassman cites Hollywood, in particular, the philosophical message gleaned from a 1959 "B" movie, *The Incredible Shrinking Man*, which he saw as a teenager. The unfortunate protagonist, played by Grant Williams, is exposed to a mist of radiation and begins to shrink. At the end of the film he crawls through the screen of a cellar vent and into a



garden; in his final monologue, as he stands vulnerable under the leaves, his fear that he will be forever trapped by his smallness gives way to a new-found enlightenment. The closing scene, which reflects the transformation of cold-war and nuclear-age fears into a new awareness of the nature of existence, is marked by a shift in scale: nature looms large, as it did during the last part of the nineteenth century when the grandeur of the American West was captured on film and shown to the world by photographers.

Mr. Glassman's dramatic use of light

and his alchemic darkroom manipulations contribute to a theatrical and romantic approach to imaging nature that is quite evident in the museum's exhibition. He not only borrows techniques from the past, he also employs them in a consideration of past values. As the millennium approaches, Mr. Glassman finds that it is timely to allow himself to indulge in a nineteenth-century reverence for nature.

NOEL KORTEN

Mr. Korten is curator and director of exhibitions at the Los Angeles Municipal Art Gallery, which featured a show of Mr. Glassman's work earlier this year; this article is adapted from an essay introducing the exhibition (Joel Aaron Glassman and Ed Martin, Los Angeles Municipal Art Gallery, 1998).

Mr. Glassman is director of media arts programs for Pasadena's Armory Center for the Arts and photography instructor at San Marino High School in San Marino. The exhibition of his work in the Exposition Park museum is on view through September 6. The photographs shown here are from his series Morning Becomes Electra.

TURNING OVER NEW LEAVES

A close look at the fungi in rain forest canopies

FOR MORE THAN 35 YEARS, AS A MAJOR part of my research as a botanist, I have methodically walked the tropical forests of the Americas and Asia collecting fungi, especially those on the leaves of living plants. My efforts have been limited to surfaces within my reach—to a maximum of about 9 feet above the ground. For clues about what I might find higher up, I have had to rely on tree climbers or on examinations of felled trees.

The fungi that I study feed at the leaf surface using several strategies. Some species produce specialized structures that allow them to plug directly into the living plant cells (to little or no apparent detriment to their host). Others obtain their nutrition from detritus on the surfaces of leaves. One group, for example, derives sustenance primarily from honeydew excreted by scale and other piercing and sucking insects; the insects in effect are middlemen, conveying the nutrients in plant sap to the fungi, and again with little damage to the host plant. All of these leaf-dwelling fungi probably have the role that their relatives in soil and on dead wood have—to recycle nutrients back into the food chain.

As I have surveyed different areas and discussed my ideas about what I see with other tropical biologists, I have often wondered if I have sampled the entire diversity of fungal species, if there were other species present that were out of arm's reach. The time-honored "visual census" method has the limitation of not permitting a rigorous comparison of fungal diversity from one forest site to another. It also makes it difficult to determine if the fungi have preferences for particular habitats—if they specialize in certain trees or thrive under certain environmental conditions.

Now, through a Smithsonian Tropical Research Institute project in Panama, I have the chance to clarify some of these issues. The project, which oversees research involving construction cranes, is making the rain forest available to me and other scientists as never before, allowing us to observe, survey, and collect organisms in the canopies' highest layers.



MARCOS GUERRA, SMITHSONIAN TROPICAL RESEARCH INSTITUTE

Two construction cranes, of the kind used to erect skyscrapers, have been set up solely for the use of researchers. One is installed in the dry tropical forest near Panama City; the second, which I use, is located in the lowland rain forest near the Caribbean shore.

With the crane, access to the forest is from the canopy's topside rather than from the ground, which is about 175 feet below. My

The view upward from inside the support structure of one of the Smithsonian Tropical Research Institute's two research cranes; the crane operator ascends to the control center using a ladder attached to this structure. In addition to coordinating the movements of the crane's arm and the researchers' cage, the operator must also watch for storms moving inland—electrical flashes from these could give a humongous tickle to the scientists in the cage!



PHOTOGRAPHS MARCOS GUERRA, SMITHSONIAN TROPICAL RESEARCH INSTITUTE

work begins early in the day, with the arrival of an experienced crane operator from Panama City. He climbs to the top of the vertical support on the crane, to reach the controls. While the motor is started and a safety check is run, I climb into a small cage in the staging area on the ground; the cage is connected to the crane's arm by a cable system. The operator and I communicate by radio, using the essential words—forward, back, up, down, right, and left—in Spanish.

The session really begins when my cage is hoisted to the level of the crane arm and moved along the arm to a position directly above my tree destination, which can be anywhere within the 60-acre area circumscribed by a 360-degree swing of the crane arm. I can then be dropped downward into the tree or even to the ground; of course, the bole, or trunk, of the tree and its large branches have to be negotiated.

Being lifted from the staging area is the most difficult part of the daily journey to the tree tops for me, since I can barely cross a busy freeway overpass on foot without feeling nauseous. But once I am positioned against the tree branches, there is a false sense of security, as though I were really on the ground. I have to be alert to the creatures around me, because some of them may cause harm; in addition to snakes and ants and other stinging insects, there are often monkeys serenely chattering among themselves as they graze on the treetop leaves. The overall sensation once aloft is a peace-

ful, carefree feeling of floating over a lush green canopyscape, with an idyllic view of ships moving through the Panama Canal off in the distance.

MY SAMPLING PLAN was designed with the help of fungal ecologist Dr. Greg Gilbert of the University of California at Berkeley and botanist Dr. Joseph Wright of the Smithsonian Tropical Research Institute. I am looking at newly emerged trees as well as at the ground level, understory, and upper level of mature growth.

On my first trip to Panama in 1997, I was able to examine about forty trees selected at random from the map of flora existing under the crane's arm. The leaf specimens I collected were dried in plant presses and prepared for shipment to the Natural History Museum of Los Angeles County for analysis; a duplicate set of specimens was sent to the herbarium at the University of Panama.

In my years of collecting fungi at arm's length, I have suspected that entirely different communities had evolved on the leaves out of reach and that these fungi occur in distinct patterns that reflect the constraints, such as height and amount of light available, of the vascular plants with which they are associated. Now, as I work in the museum's laboratory studying the new specimens that I collected from the crane's cage, I hope to begin to discover if these ideas have any validity. I believe the results of this survey will contribute to our understanding of the

dynamics of tropical forest biodiversity and, ultimately, to efforts toward providing better protection for the planet's health.

DON R. REYNOLDS
Curator of Botany

Dr. Reynolds, who has been curator of botany at the Natural History Museum since 1975, received his Ph.D. from the University of Texas at Austin, studying under the eminent mycologist C.J. Alexopoulos. He attributes his interest in nature to his grandmother and his enthusiasm for fungi to H.D. Thiers, recently retired as dean of California mycology from San Francisco State University.

Dr. Reynolds sponsors the Los Angeles Mycological Society, a group of amateur mushroom hunters that meets in the museum during the southern California mushroom season. Although he does not eat mushrooms (the taste reminds him of the almost unpleasant smell of them growing in petri dishes in the laboratory), he does like an occasional cookup of Corn Smut fungus in ravioli or soup.

Left: In this aerial view of the "wet forest" crane, the researchers' cage is positioned about two-thirds of the way to the arm's terminal end. The crane itself is permanently installed in a relatively open area above a creek running through eastern Panama's pristine lowland climax forest.

Right: Two researchers view the upper surface of the canopy from the cage. Pink ribbons in the nearby trees mark permanent sampling stations for one of the many surveys being conducted from the crane.

THE PAVILION OF WINGS

AT APPROXIMATELY 2 O'CLOCK ON A Wednesday afternoon in late April, the sun finally began to break through the seemingly impenetrable bank of clouds that had blanketed Exposition Park for most of the week. In the Natural History Museum's new butterfly house, nearly 400 butterflies—including Painted Ladies, Zebra and orange longwings, Red Passion Flower Butterflies, and Black Swallowtails—slowly began to take wing. Having spent their first few days in the enclosure enduring what for butterflies is paralyzing cold, my delicate charges could now bask in the sun, patrol the gravel pathways, and drink nectar from colorful lantanas and pincushion flowers. After 2 years of planning, the Pavilion of Wings was finally becoming a reality.

The pavilion is the result of the museum's partnership with HomeBase, Inc., which sponsored and helped create a beautiful garden to provide both food and shelter for the butterflies. The structure itself, built by the Minnesota-based company Spineless Wonders, features a railroad tie foundation anchored with reinforced steel bars and bolted to a steel frame that looks a little like the rib cage of a giant prehistoric creature. Footpaths of decomposed granite lined with river rock meander through raised beds that

are filled with nectar-rich flowering plants provided by HomeBase. The frame is wrapped in a skin of fire-retardant shade cloth designed to protect the plants from the summer sun and ensure that the inhabitants stay inside.

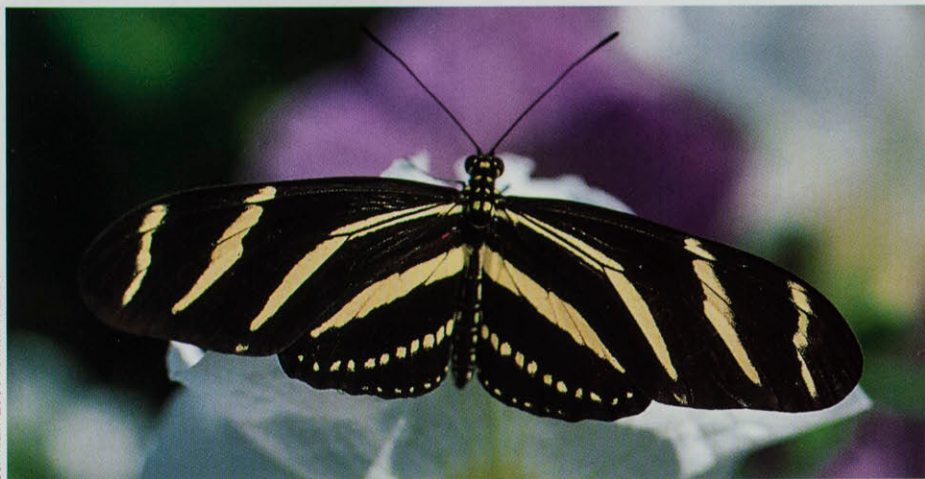
The flower-nectar diet of the butterflies is supplemented with feeding stations stocked with sugary solutions and fermenting fruit. At any time, between 200 and 300 individual butterflies and moths representing up to 40 species native to the United States can be found in the 36- by 90-foot pavilion.

Because most of the butterflies and moths in the pavilion originate from outside of California, the enclosure was closely inspected by the state and federal agriculture departments to certify that we had taken every precaution to ensure that the resident lepidopterans would not escape from the new exhibit. The caterpillars of butterflies and moths are voracious feeders, and species from other parts of the country can be pests if they become established in areas where they are not kept in check by their natural enemies. And some species may carry disease that might infect our native populations of butterflies and moths. The pavilion is equipped with double door



Above, visitors enjoy the newly opened Pavilion of Wings on the Natural History Museum's south lawn. Below, a Julia (*Dryas julia*), a species native to Florida and tropical America, begins its new life in the butterfly house.





vestibules and air curtains that work to make sure individual insects do not hitch a ride out of the enclosure on the clothing of exiting visitors.

Staff hosting and maintaining the butterfly house have received special training. The gallery interpreters greeting visitors and working in the pavilion need to keep a sharp eye out for lepidopterans attempting to travel out of the enclosure. Meanwhile, Insect Zoo technicians keep the pavilion stocked. Because the average lifespan of an adult lepidopteran is 7 to 14 days, approximately 200 butterfly and moth pupae are imported by mail each week from butterfly farms in California, Florida, Minnesota, and Texas. As they arrive, Kelli Walker and Juana Mercado of the Insect Zoo carefully inspect each package for diseased and parasitized pupae; any found are immediately destroyed. Healthy pupae are then glued to cotton cords with beads of silicon and suspended in a cage. As the adult butterflies emerge—within a few days or weeks—they are placed in another cage for transport from the Insect Zoo insectary to the pavilion, where they are released throughout the day.

Both the Pavilion of Wings and *Butterflies in Living Color*, a related summer exhibition in the Dart Gallery of the Exposition Park museum, engage museum visitors with fascinating facts about butterfly biology. The live inhabitants of the pavilion offer a chance to see firsthand the features and behavior covered in the more traditional

museum exhibit formats. Adult lepidopterans suck up nectar and other fluids to get energy for mating and flight. Moth and butterfly mouthparts are uniquely fashioned to serve this purpose: jaws are modified into a long pair of grooved filaments that mesh to form a canal. This tonguelike organ, the proboscis, is inserted down into liquid food and used like a straw for siphoning up the fluid. When it is not in use, the proboscis is held in a tight coil under the head.

At the "Liquid Lunch" display in *Butterflies in Living Color*, you can push a handle and make a giant proboscis unfurl into a flower and then curl up again. In the pavilion, you can see real proboscises in

action as you watch butterflies darting from flower to flower searching for nectar or sipping fluids from fruit allowed to ferment at the feeding stations.

The beauty of butterflies has gained them human sympathies usually reserved for furred and feathered creatures, and they have become important ambassadors for the Insecta, a class of organisms that all too often inspires indifference if not alarm and revulsion. Since its opening in the spring of 1992, the Ralph M. Parsons Insect Zoo has introduced thousands of visitors to the tiny worlds of insects and their relatives. Through special exhibits and programming, such as the Pavilion of Wings, the museum will continue to inspire future generations of educators and scientists and to build public support for insects, which are key to the preservation of biological diversity.

ARTHUR V. EVANS
Insect Zoo Director

Dr. Evans is director of the Insect Zoo at the Natural History Museum. He has written a number of papers on the systematics and biology of scarab beetles, which are his special area of interest, and is working with researchers at the University of Nebraska to produce the first identification manual for the New World genera of scarabs in the subfamily Melolonthinae and a



catalog to the species. Dr. Evans and Charles L. Bellamy are authors of *An Inordinate Fondness for Beetles* (Henry Holt, 1996), an illustrated overview of the immense diversity in the coleopterans, the largest order of living organisms; a Japanese language version of the popular book will be published by Springer Verlag in the fall of this year.

The Pavilion of Wings, which Dr. Evans designed and curated, is located on the south lawn of the Exposition Park museum and is open through September 6, as is *Butterflies in Living Color*, a related exhibit in the museum's Dart Gallery.



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Page 16, top, and left, a Zebra (*Heliconius charitonius*) settles in for a night in the Pavilion of Wings. Page 16, bottom, a Painted Lady (*Vanessa cardui*) basks on a petunia.

There's no need to release butterflies . . . THEY ARE ALREADY FREE!

Basking in their first moments of nuptial bliss, brides and grooms around the country are exiting churches, showered not with rice or confetti, but surrounded instead by the fluttering gossamer wings of hundreds of butterflies. All but unheard of just a few years ago, butterfly releases are the latest fashion at weddings, not to mention at memorial services, grand openings, divorces, and prison releases.—Carol Kaesuk Yoon, "Festive Release of Butterflies Puts Trouble in the Air," New York Times, September 15, 1998

PUBLIC INTEREST IN BUTTERFLIES is on the rise, but the release of live butterflies at celebrations is the dark side of this increase in popularity. Although the appeal of butterfly releases is understandable (what could be more beautiful and satisfying than adding butterflies to the environment?), the practice is really a particularly long-lasting form of environmental pollution.

The message of the film *Jurassic Park*, "Don't fool with Mother Nature," has scientific foundations in this case. Butterflies raised by unregulated commercial interests to be released may spread diseases and para-

sites to wild populations, with devastating consequences. Often, butterflies are released at great distance from their points of origin; when the same species is present naturally in the area of release, the result is inappropriate genetic mixing of different populations. When the same species is not present, a nonnative species is being introduced into the area: at the least, this confuses studies of butterfly distribution and migration—at worst, it may wreak havoc on the local ecology.

Butterfly releases also create a commercial market for live butterflies (which are currently selling for about \$10 apiece). As trade becomes more and more lucrative, wild populations—such as monarchs that overwinter in Mexico and on the California Coast—could become targets for poachers.

The interstate shipment of live butterflies currently requires a permit from the U.S. Department of Agriculture, but the law is not usually enforced. In general, the Department of Agriculture may issue a permit for shipment of eight species, including the Red Admiral,

Giant Swallowtail, Gulf Fritillary, and Zebra. We believe that selling these four species for release is particularly inappropriate because they are not naturally found over much of the United States.

A solution that better serves the public interest, with less regulatory burden, is to ban the release of commercially obtained butterflies into the environment altogether. The capture, captive breeding, transport, and release of native and nonnative birds has been prohibited or tightly regulated for most of the twentieth century—the time has come to do the same with butterflies.

Jeffrey Glassberg, President, North American Butterfly Association

Paul Opler, Author of *Peterson Field Guide to Western Butterflies*

Robert Michael Pyle, Author of *Audubon Society Field Guide to Butterflies*

Robert Robbins, Curator of Lepidoptera, Smithsonian Institution

James Tuttle, President, Lepidopterists' Society

This article is an excerpt of a position paper that appears on the web page of the North American Butterfly Association, at www.naba.org/weddings.html.

The drawing is by Pasadena-based artist William Stout, a long-time museum member.



THE ANCIENT ROADS OF AREQUIPA

IN THESE DAYS OF CELL PHONES, FAX machines, E-mail, and overnight deliveries, it is hard to imagine that human beings were once the fastest and most efficient message carriers available. At the height of the Inca Empire, during the fifteenth and early sixteenth centuries, official runners known as *chaski* transported messages along the road systems that dissected the Andean mountain chain. Along important routes, runners were stationed a half mile to five miles apart, depending on the terrain and altitude, and dispatches were handed off from one runner to the next in relay style. An early Spanish chronicler wrote that Inca runners were able to carry letters from Lima to Cuzco (a trip requiring 12 or 13 days on horseback) in just 3 days. *Chaski* were indeed the swiftest messengers available, and the roads they traveled were the arteries that kept goods, information, and services—the lifeblood of the Inca Empire—flowing throughout the realm.

The Inca maintained royal highways as well as informal pathways, and they built



roads across all kinds of terrain in the highly varied landscapes of the Andean region. Wide roads with mud sidewalls ran across the barren coastal deserts, while narrow pathways and stone stairways wound through the most mountainous terrain. Stone walls lined huge roads in the high plains, and raised earthen causeways crossed the marshes. These roads were the mainstay of the empire, allowing the efficient communication and the quick movement of armies and supplies that were critical to the success and expansion of the empire.

Transportation under the Inca was a tightly controlled industry. In addition to the *chaski* runners, men and llamas were used to move goods around the empire. The llamas and alpacas, South American members of the camel family, were the largest domesticated animals available in the Andean region. Too small and delicate to be ridden, llamas can carry only about 40 pounds on their backs, and large caravans were needed for most undertakings. Herders would lead long trains of the animals along the roads at the bidding of the central government. Men also carried large loads along the roads and

paths that crisscrossed the empire.

The ruins of the Inca roads, which are found throughout their former lands, have been intensively studied, and entire books have been written on the impressively complex system. Yet at least one important section of this trade and communications network remains virtually unknown; this is the portion of the road system that runs through Peru's Department of Arequipa, where I began a new research project last year. Our discoveries in 1998 included fifty-five newly recorded archaeological sites, several of which may be up to 10,000 years old. We also found 3,000-year-old settlements belonging to the first farmers of Arequipa and a network of rock art and roadside rest sites along an important set of ancient roads running from above and below into the Arequipa Valley, where five rivers join together at about 6,000 to 7,500 feet above sea level.

The Arequipa Valley is a major crossroads of trade and communication routes that run between Peru's coast and highlands. The valley is the intersection point for roads extending from coastal fishing villages and agricultural areas to major inland centers of agriculture, herding, and mining. Today, the city of Arequipa is a natural stopping point and the major commercial hub south of Lima. Our work is showing that the geographical situation that makes Arequipa important now has been recognized and exploited for millennia, especially during the past 3,000 years as native Peruvian civilization has developed.

When the Spanish arrived in what is

KAREN WISE



Above: Augusto Cardona takes notes at the site of Pillo, near Arequipa. Mr. Cardona, who was born and raised in Arequipa, has a professional degree (licenciado) from the Universidad Católica "Santa María" and has conducted research throughout Peru. He directs the Center for Archaeological Research in Arequipa and is Dr. Wise's main research collaborator in Peru.

Right: An Inca causeway across the high plains of Puno, an area that is better studied than Arequipa.

Page 19, top: Project members examine rock art found at the bottom of an ancient pathway that zigzags down a steep hill at a site outside of Arequipa.





KAREN WISE

now Peru in 1532, the Inca Empire controlled a vast area, including what is now Ecuador, Peru, and Bolivia as well as parts of what became Chile and Argentina. The capital of the Inca was the sacred city of Cuzco. Arequipa was part of an important province known as Kuntisuyo, and the Spanish recorded that the several important Inca cities there included a settlement of Inca nobles from Cuzco living at the site of Yumina, a hill surrounded by agricultural fields in the middle of the valley. Spanish colonial documents indicate that there were also several thriving cities on the hillsides rimming the valley, where local peoples under the control of the Inca made their living by farming; these people also herded llamas and alpacas, raised *cuy* (guinea pigs) for food, wove both elaborate and everyday textiles, made pottery, and worked copper and stone. Caravans of llamas brought river shrimp and seafood from the coast and obsidian and other goods from the higher

elevations. Copper and other metals mined from the mountains surrounding Arequipa were brought into the valley as well.

Cuzco, the Inca capital, was many miles and some days' walk away to the north, but people, animals, metal, stone, and dried fish and seaweed, as well as items of tribute from farther south, flowed both into and out of the Inca towns in the Arequipa area. The trade that went through Arequipa was part of an elaborate and efficient system that moved goods and services from each of the provinces to wherever the Inca emperors needed them. Although Spanish documents indicate that such trade was important in Arequipa, no one has studied the ancient roads or the archaeological sites that lie along their remains.

During the next several years, I will study the ancient roads of Arequipa with my Peruvian colleague, Augusto Cardona, a native *Arequipeño*. We will walk and drive along the roads, retracing their paths from the coast to more than 10,000 feet above sea level. Using a combination of aerial photographs, global positioning system readings, and old-fashioned survey techniques, we will map the roads, documenting their routes, size, and construction methods and the sites along them. We will also excavate selected archaeological sites, both Inca and pre-Inca, to identify the types of trade and commerce that were important during different time periods. The ultimate goal of our research is to understand the role of trade and commerce—and the importance of Arequipa itself—in the development of native Andean civilization between about 5,000 and 500 years ago.

Peru, like many other countries, is developing quickly, and its archaeological sites are being destroyed by modern roads, cities, and irrigation projects as modern transportation and commerce grows. This project is probably one of the last chances to document an important piece of history. The more efficient and widespread modern transportation and commerce become, the more difficult

it will be to study the ancient systems that were the foundation of empires.

KAREN WISE

Associate Curator of Anthropology

Karen Wise was born in San Francisco and first became interested in archaeology in elementary school, after seeing a movie on Mary Leakey's discovery of early hominids in Olduvai Gorge. She attended Wesleyan University in Connecticut and participated in archaeological field projects in the southwestern United States each summer. Dr. Wise became interested in the archaeology of Peru while a graduate student at Northwestern University, where in 1990 she received her Ph.D. in anthropology, with a specialization in archaeology. She joined the staff of the Natural History Museum in 1991.

The Arequipa Valley Archaeological Project is conducted under permit from the Peruvian National Cultural Institute. The first field season was supported through the Center for Archaeological Research in Arequipa by the Sociedad Minera Cerro Verde.



AUGUSTO CARDONA

The 1998 field crew in Arequipa: From left to right, top row: Dr. Karen Wise; Giancarlo Marcone, a student from the Pontificia Universidad Católica del Perú; Miriam Doutriaux, a Canadian who is a graduate student at the University of California, Berkeley; Peter Covell, a 1998 graduate of the University of Oregon; Enrique Lopez-Hurtado, a student from the Pontificia Universidad Católica del Perú; and Clorinda Orbegoso, a student from the Pontificia Universidad Católica del Perú. **Bottom row:** Azucena Ugarte, a student from the Pontificia Universidad Católica del Perú; Gabriela Cervantes, a student from the Universidad Católica "Santa María"; Tiffany Tung, a graduate student from the University of North Carolina; and Rachel Goddard, a graduate student from the University of California, Berkeley.



KAREN WISE



TEN-CENT CAMEL RIDES? HEADHUNTERS from the Philippines? Klondike Eskimos? In 1906, they were all part of the amusement scene created by the entrepreneurial visionary Abbott Kinney for Venice, California.

Mr. Kinney, a wealthy cigarette manufacturer, transformed the commercially worthless salt marshes south of Santa Monica into a Continental-styled beach community that he hoped would foster a cultural Renaissance. In 1904, he planned a new city around a network of canals and a central lagoon in imitation of

the waterways of Venice, Italy. He then built hotels, saloons, restaurants, a racetrack, a casino, and an arcaded Venetian-styled business street as well as a bathhouse with a saltwater plunge, a 1,700-foot-long pleasure pier with an auditorium, ship café, and bandstand pavilion, and a miniature railroad for transportation within the town.

Kinney's original dream was to convert Venice into a worldwide cultural center by hiring the best lecturers and performers of the time—including *Ramona* author Helen Hunt Jackson, the Chicago Symphony, and Sarah

Bernhardt. But most of the resort's visitors did not share his enthusiasm for "culture." There were too many other distractions and more sensational diversions on the beach and the piers in nearby Santa Monica and Ocean Park.

So Mr. Kinney, astute businessman that he was, concentrated on popular taste and arranged to have rides, exhibitions from other countries, and amusements from Portland's Lewis and Clark Exposition shipped into Venice instead. The Midway Plaisance, which opened in 1906, took its name from the 1893 Chicago World's Fair and was the beginning of

MUSEUM ON THE MOVE

the honky-tonk carnival atmosphere that would come to characterize the Venice Pier in later years. At the Klondike exhibit from the Canadian gold rush, visitors could see Eskimos and a placer mine and cabin set near a stream amid mountain scenery. Representatives of the Igorot peoples of the Philippines competed for attention with a three-story teahouse from "Fair Japan." One of the more exotic offerings on the Midway was named the Streets of Cairo and featured a reproduction of Alhambra Plaza in Cairo complete with Turkish merchants, bazaars, tiny cups of Turkish coffee, a fortune teller, an Egyptian mummy collection, and camel rides.

Mr. Kinney's resort prospered until World War I, when conservation of wheat and sugar and other goods impacted the commerce in recreational foods such as hot dogs and sodas. Worse than that, southern California was heavily affected by an influenza epidemic, which claimed the lives of two of the Kinney children. By the end of the war, Venice's popularity as an amusement center had begun to wane. Other attractions, namely movies, radio, and automobiles, were vying for the public's free time.

Abbott Kinney's death in 1920 symbolized the decline of Venice. A fire later destroyed the pier and, with Prohibition, liquor taxes and licenses were outlawed. In 1925, when Venice voted to be annexed by the City of Los Angeles, L.A.'s "Blue Laws" began to be enforced, severely restricting gambling, public dancing, and business hours. Then in 1929, after years of debate over sanitation problems, most of Venice's canals were cemented in.

In spite of these events, the community that Abbott Kinney founded has remained one of the country's most diverse and colorful areas, and the personality of "Venice of America" shaped in those first decades of the century has endured.

JACQUELINE MORIN
Curatorial Assistant in History

■ FELLOWS ENJOY SPECIAL PROGRAMS

The Fellows, members who support the Natural History Museum at the highest level, started off 1999 with a special presentation by Rick Ridgeway, one of the world's foremost mountaineers and adventurers. On a cool, rainy day in Los Angeles, the Fellows were transported to the warm African savannas as Mr. Ridgeway talked about his recent 300-mile trek across East Africa; he related the challenges facing the native peoples, described eye-to-eye experiences with animals in the wild, and left us considering questions about the future of all the area's residents.

Other highlights of the spring roster of Fellows events were a trip to Raleigh Studios for

a presentation on the history of the motion picture studios by Museum Associate Marc Wanamaker, and an evening reception and talk with Dr. Jack Horner, paleontologist with the Museum of the Rockies and dinosaur hunter extraordinaire. In May, archaeologist Dr. Brian Fagan discussed his new book, and Cynthia Moss talked about her 30-year study of the behavior of elephants at Amboseli National Park in Kenya.

If you are interested in being more involved with the Natural History Museum and enjoying special programs with visiting scientists, explorers, and historians, please consider becoming a Fellow. In addition to providing you with many personal benefits, your annual gift of \$1,000 or

Report from Pago Pago

A CORAL REEF SURVEY

GORDON HENDLER



of the Samoan Department of Education. Larry had kindled my interest in the Samoan fauna by involving me in the development of his field guide to reef invertebrates for Samoan high school teachers and students. He and his family gave me a wonderful introduction to Samoan culture and hospitality during my visit. I hope that our collaboration will continue be-

cause our survey is far from complete, and we made new and unexpected finds on every dive.

We are grateful to many friends in Samoa and friends of the museum who made this expedition feasible; we are indebted for the generous underwriting from Mrs. Karen J. Friedmann and for contributions from Jerry and Zorica Sorkin, Mike and Audrey Hollander, and Samuel Ward.

Gordon Hendler, Curator of Echinoderms

IN APRIL, I FLEW TO PAGO PAGO TO begin an in-depth 3-week survey of the coral reef animals in American Samoa. This was my first extensive field experience in Polynesia, and it was a revelation: I now have a clear grasp of the impact of hurricanes and human activities on the Samoan coral reef community and a solid understanding of marine biodiversity in the mid-Pacific region. (I also have vivid memories of the pain involved in trudging across an expansive reef flat in the blazing sun while wearing full scuba gear and thin-soled footwear.)

As a result of a strenuous effort, the museum now has the most complete collection of Samoan echinoderms in the world. Some of the specimens, which have so far defied my abilities for identification, are clearly important finds. The whole array of beautiful animals proves that the Samoan fauna is richer than previously thought.

Fortunately, in these endeavors, I had the unstinting help and expertise of Larry Madrigal,



LARRY MADRIGAL

more will support exhibitions and educational programs at the museum, enhancing learning for 250,000 school children each year and enriching the lives of all of our visitors. For more information, please call 213/763-3308.

■ NEW DEPUTY DIRECTOR FOR RESEARCH AND COLLECTIONS

At the end of May, after a nation-wide search, John E. Heyning was appointed Deputy Director for Research and Collections, to head one of the Natural History Museum's largest divisions.

Dr. Heyning, who has been on the museum's staff for 15 years, is a specialist in the natural history, anatomy, evolution, and conservation of cetaceans. As curator of mammalogy, his oversight includes the museum's Marine Mammal Research Laboratory and the Marine Mammal Stranding Program, a project that he has been involved with for more than two decades. In the course of his research, which has taken him to every continent in the world, Dr. Heyning discovered an unusual temperature regulation system in gray whales and described how beaked whales use suction to vacuum up their prey. He has received an Accommodation from the United States government for his work on marine mammal conservation issues.

In addition to having authored more than 50 scientific and popular articles, Dr. Heyning wrote *Masters of the Ocean Realm: Whales, Dolphins, and Porpoises*, a book that serves as catalog to the museum's exhibition of the same name; Dr. Heyning was curator for the exhibit, which is now traveling throughout North America. He is currently working on his second book, *Cetacean Evolution*, which will be published by Academic Press in 2000.

Dr. Heyning received his Ph.D. in biology in 1986 from the University of California, Los Angeles, where he is now adjunct associate professor of biology. He is assistant editor for the journal *Marine Mammal Science* and serves on various governmental and conservation organization committees that advise on the wise management of marine mammal populations.

■ NEW CURATOR OF DINOSAURS

Luis M. Chiappe has joined the museum staff as Associate Curator of Vertebrate Paleontology. An expert on dinosaurs and the origin and early evolution of the birds, he will as-

sume responsibility for the museum's collection of dinosaur fossils.

For the past 15 years, Dr. Chiappe has collected and studied crocodilians and birds in various parts of the world and especially in Argentina; his current work there focuses on the country's southernmost area, the vast barren tableland known as Patagonia, where he was part of the team that discovered the first embryos of the long-necked semiaquatic dinosaurs known as sauropods. A book that he and Lowell Dingus wrote, *The Tiniest Giants*, is an account of these exciting finds geared toward young readers. Since 1993, he has participated in dinosaur expeditions to Mongolia and western China. More recently, in studies of the origins of avian flight, Philip Burgers and Dr. Chiappe have used aerodynamic theory and biomechanics to suggest that a running start was needed to get one of the earliest birds, *Archaeopteryx*, aloft.

A native of Argentina, Dr. Chiappe received his Ph.D. in biological sciences from the Universidad de Buenos Aires in 1992. He is a research associate in the Departments of Ornithology and Vertebrate Paleontology at the American Museum of Natural History in New York; he also serves as visiting professor at the Universidad Nacional de San Luis in Argentina and as research associate and advisor on vertebrate paleontology for the Science Council of the Province of San Luis.

■ GRANT FOR CRUSTACEA SURVEY

Todd L. Zimmerman, a graduate-student-in-residence at the Natural History Museum, and Joel W. Martin, Curator of Crustacea, have received a grant of \$183,000 from the National Science Foundation to conduct a marine biological survey of Guana Island in the Caribbean. The island, which is privately owned and pristine, is a part of the British Virgin Islands; it is influenced by both Atlantic and Caribbean currents and boasts the highest terrestrial biodiversity of any island of its size in the Caribbean.

Guana Island's communities of marine organisms are not well known, but their biodiversity also promises to be high. Mr. Zimmerman and Dr. Martin will coordinate the efforts of a team of scientists in surveying the marine "cryptofauna," which includes small crustaceans, polychaete worms, molluscs, echino-

derms, and other invertebrates living in the sand and rocks around the reefs. The project should result in the addition of a large number of interesting and unique organisms to the museum's collections. The survey will also provide a baseline against which to compare the situation off other Caribbean islands where the marine habitats have been adversely affected by the activities of people.

The Natural History Museum's curatorial expertise in marine invertebrates is particularly strong, and our experts in polychaetes, echinoderms, and molluscs will participate in some of the field work as well as help identify organisms collected as the survey progresses.

■ 1999 DINOSAUR BALL

The seventeenth annual Dinosaur Ball, the museum's black tie fund-raising event, celebrated the Natural History Museum's eighty-fifth anniversary, with mementos from the institution's distinguished history on display and images from the past projected onto the walls of the foyer. More than 700 donors and friends of the museum dined on Patina's elegant fare and danced among the dinosaurs to the music of the West Coast Sound Orchestra. Guests headed home with souvenirs donated by Farmers Insurance Group.

The museum is grateful to the individuals, corporations, and foundations who supported and attended the ball. A special thanks to Diane Dykema and Heather Haaga for their outstanding work as chairs of the committee, and to Joan Wrede, who compiled and edited the slide show.

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Fred Noble and Diane Dykema (left) and Mr. and Mrs. Paul Haaga, Jr. Diane Dykema and Heather Haaga were co-chairs of the 1999 Dinosaur Ball

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TERRA (ISSN 0040-3733) is published bimonthly by the Natural History Museum of Los Angeles County and sent as a benefit to museum members. ■ Produced by the Publications Office, Museum of Natural History, 900 Exposition Boulevard, Los Angeles, CA 90007. ■ For membership information, visit the Membership Office at the Museum of Natural History in Exposition Park or call 213/763-3426. ■ Copyright 1999 by the Los Angeles County Museum of Natural History Foundation. All rights reserved. Reproduction by any means in whole or in part without permission is prohibited.

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Designed by Dana Levy, Perpetua Press
Printed on recycled paper by Castle Press

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Natural History Museum of Los Angeles County
Exposition Park, Los Angeles, California 90007

The Butterfly Pavilion Shop and the Gallery Store are stocked with enchanting gifts and educational materials, including books, videos, and CD-ROMs on butterflies and moths as well as posters, stationery, T-shirts, toys, and jewelry and craft items with a lepidopteran theme!



BUTTERFLY GIFT SHOPS

Casey Coleman's women's blouses and matching button covers are 100 percent cotton, machine-washable, and artfully decorated with butterflies in flight.
Shirt, \$69.95. Button covers, \$17.95, set of four.

The Butterfly Alphabet Poster is a delightful new way to learn the alphabet as well as enjoy the variety of design and vibrant color in the realm of nature's crown jewels, the butterflies.
18 by 24 inch color poster, \$8.



Butterfly Gardening in Southern California, the spring 1999 issue of *TERRA*, is a lavishly illustrated guide to forty species of butterflies that can be lured into our gardens and yards.
36 pages, 54 color illustrations, \$3.

Museum members receive a discount on purchases in all museum stores!

Dinosaur Shop and Explore Store/Exposition Park Museum: 213/763-3488

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